U.S. Department
of Transportation
Federal Aviation
Administration

New York Aircraft Certification Office

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DEC - 2 2004

Mr. Bohdan Goyaniuk
Chief, Continuing Airworthiness
Transport Canada Civil Aviation
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330 Sparks Street
Ottawa, Ontario, K1A 0N8
Canada

Dear Mr. Goyaniuk:

Subject: Recommendation for Changes to the CL-600-2B19 Aircraft Design

The purpose of this letter is to recommend actions by Bombardier Aerospace (BA) as a result of our review of factors pertinent to the recent CRJ-200 accident incurred by Pinnacle Airlines on November 4, 2004. As you know, the accident aircraft experienced a departure from controlled flight at FL410 and subsequent dual engine failure with no successful air start.

We have identified several actions that are prudent to take after review of the Flight Data Recorder (FDR), participation in meetings with the National Transportation Safety Board (NTSB), and a familiarization flight in the CRJ-200 simulator at the BA Training Centre in Montreal. These actions are listed below.

1. Recommend changing to the Aircraft Flight Manual (AFM) Dual Engine Failure Emergency Procedure. The current procedure implies that the aircraft is to be accelerated to the required 300 KIAS after reaching the top of the windmill start envelope (21,000 ft MSL). The procedure is not clear that it is expected that the pilots accelerate to 300 KIAS before 21,000 ft; at this time this is only a technique that is assumed pilots will accomplish. The FDR data shows that the accident aircrew did not have the required airspeed at 21,000 ft and therefore missed the opportunity for a windmill air start. It is unknown why they did not achieve the necessary parameters. However, the specific steps in the AFM procedure require maintaining 240 KIAS until ready for windmill air start, and the windmill air start procedure requires acceleration to 300 KIAS. This may mislead aircrews to miss as much as 5,000 ft of the windmill start envelope in trying to accelerate to 300 KIAS starting from 21,000 ft. In both documented cases of a dual engine failure (both during flight test in Wichita) the company pilot immediately accelerated to 300 KIAS and was successful in achieving a windmill air start each time with minimum altitude loss. We therefore recommend that the AFM Emergency Procedure for Dual Engine Failure be changed to require an acceleration to 300 KIAS at an appropriate altitude so as to reach 21,000 ft MSL with 300 KIAS and have all necessary windmill air start steps accomplished so that at 21,000 ft, the only remaining action is to pressurize the engines with fuel (Throttles out of OFF position).

2. Recommend changing the airspeed tape display software to more accurately depict the top of the Low Speed Awareness (top of the red band) at all altitudes and Mach Numbers. During presentations by BA Flight Sciences engineers at the NTSB meeting in Montreal on November 16, 2004, it was determined that at the stall conditions that initiated the Pinnacle Airlines

accident (FL 410) the stick shaker activated approximately 10 KIAS above the top of the Low Speed Awareness queue (red band). Apparently this characteristic is typical of the current design in at least the CL-600-2B19, and possibly all other variations of the CRJ and possibly the Challengers and Global Express. This characteristic is apparent as a function of Mach number and is at least related to the change of shaker/pusher angle-of-attack (AOA) firing angles as Mach number increases. This is not apparent until either higher Mach numbers are experienced or at high altitudes. This characteristic at these higher altitudes and/or Mach numbers does not meet the intended function (CFR Part 25.1301) of giving the pilot a relative perspective of the aircraft current airspeed in relation to stall warning speed and may introduce an element of surprise when the stick shaker activates above the expected airspeed. We therefore recommend a design change as soon as possible in all Bombardier jet aircraft as applicable.

3. Recommend BA publish an All Operators Message (AOM) as soon as possible that includes a discussion of the following points concerning CRJ high altitude operations:

a. Emphasis on the importance in maintaining the appropriate climb profile (airspeed/Mach) during climbs to high altitude (especially above FL370) and the impact of exchanging airspeed for altitude in order to reach the desired altitude.
b. Emphasis on the performance capabilities/limitations of the aircraft to maintain a minimum 500 fpm rate of climb and the need to notify Air Traffic Control (ATC) if performance charts predict a slower climb rate.
c. A discussion on the excess thrust available (or lack thereof) at climb/cruise airspeeds at the higher altitudes and the fact that below certain speeds steady level flight may not be possible.

The above AOM recommendation is based on not only Pinnacle Airlines FDR data but also on FAA reports of altitude violations on CRJ-700 aircraft due to unapproved descents from FL410 due to lack of performance. For this reason, the recommended AOM should go to all CRJ operators (all variants and models).

We recommend that the AOM be published as soon as possible before December 31, 2004.

For specific questions please contact Rod Huete, Flight Test Pilot, 516-228-7318

Sincerely,

Vito A. Pulera
Manager, New York Aircraft Certification Office

cc:
Mr. Keith Barnett - Bombardier Montreal